The Monthly Evening Sky Map

A SCIENTIFIC JOURNAL AND EDUCATIONAL GUIDE IN ASTRONOMY FOR THE AMATEUR

Founded in 1905 by Leon Barritt

ALSO A STAR, CONSTELLATION AND PLANET FINDER MAP ARRANGED FOR THE CURRENT MONTHS - MORNING AND EVENING - AND PRACTICAL ANYWHERE IN THE WORLD

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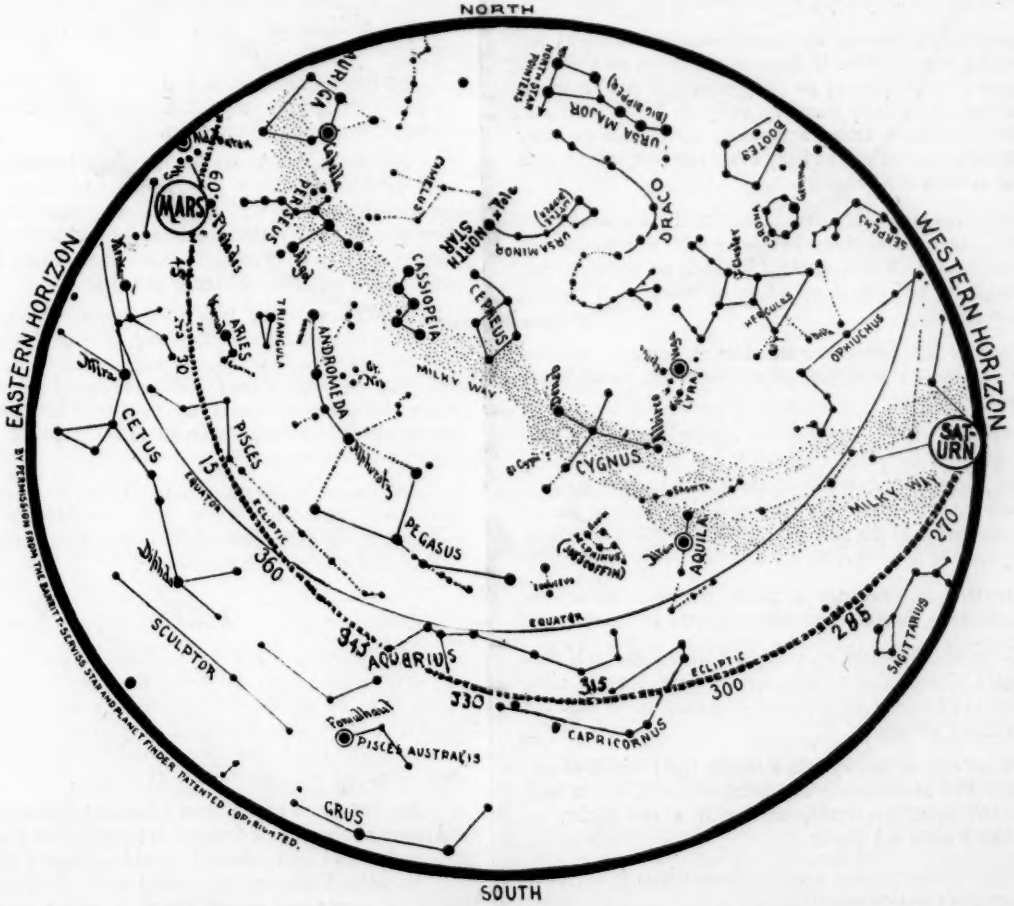
EVENING SKY MAP FOR OCTOBER



AT 9:00 P.M., OCT. 1 **8:00 P.M., OCT. 15** **7:00 P.M., OCT. 31**

Face South and hold the Map overhead, the top North, and you will see the stars and planets just as they appear in the heavens. The arrow through the two stars in the bowl of the Big Dipper points to the North Star, the star at the end of the handle of the Little Dipper.

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

THE DATE BELOW EACH NUMERAL WILL SHOW WHEN THAT SECTION OF THE MAP WILL BE ON THE MERIDAN—DUE SOUTH—AT 9 P.M. OR AN HOUR EARLIER FOR EACH NUMERAL WEST OF THIS DATE AND AN HOUR LATER FOR EACH NUMERAL EAST.

PLANETARY OBSERVING

By F. M. Bateson

Observation of the principal planets has always attracted the amateur. His attention has been devoted mainly to Mars, Jupiter and Saturn, but Venus too is within range of some amateur's telescopes.

In making observations of the planets there are certain fundamental points, which however commonplace they may appear, bear repeating. They can be summarized as:

1. Keep a clear record of any observation, preferably in a suitable exercise book.
2. Drawings should be made on separate sheets of smooth drawing paper or on suitable cards.
3. Do not pile observations in the notebook but communicate them to an organisation where they can be used in conjunction with other records.
4. Commence each record by stating the date; time (in U.T.); place and instrument, with powers employed. Do not forget to include the year. It may sound hardly credible but at times the writer has received records such as "Tuesday Jupiter" followed by the observation.
5. State briefly weather conditions at commencement and during observations. If the seeing is given on the usual scale of 0 (hopeless) to 10 (perfect) it is of material assistance. Nobody wants an essay on the weather and two brief lines stating amount of cloud, haze or other obscuration, seeing, and any other relevant information are all that are necessary.
6. Each drawing should have alongside the date with year; U.T.; seeing and observer's name with instrument and power used. When applicable, such as with Jupiter, longitude of central meridian or other such data is also stated.
7. Have as few pre-conceived ideas as possible. *Observe and draw just what you see not what you thought you you should see.*
8. Drawings should be made in a short time due to the rotation of the planets. Sketch in rapidly and accurately the principal features first, taking care to have them in their correct position; then add the faintest details commencing at the preceding limb. *Complete the drawings at the telescope. Never alter drawings afterwards.*
9. Accuracy in drawings is much preferred to artistic work. Few observers are artists; most can be accurate.
10. Use pencils for drawing; shading with a stump if necessary. Coloured drawings are all right for the artist who knows what he is doing, but most of us lack the necessary ability.
11. Do not expose the eyes to a bright light whilst observing. For illuminating the notebook, etc., use a well shaded light, preferably one with a red globe, or covered with red paper.
12. With all the planets regular observations bring skill from the practice acquired.
13. Do not think that in these days of large telescopes and modern techniques there is no work for the amateur. Our knowledge of the surface features of the planets has come largely from the regular observations by amateurs. An instance is the *B.A.A. Jupiter Memoirs*,* within which lies almost all our knowledge of the surface features of this planet.

VENUS

Due to the faint and indefinite nature of its markings, this planet is apt to be disappointing. It is best observed in daylight or twilight when the glare is not too strong.

The perfection of the object glass, or mirror, is more essential in observing Venus than the size of the telescope. Good work has been done with a 5-inch refractor. Eyepieces should be chosen with care and wide field ones are the best.

Observations broadly consist of:

(a) Recording notes of the appearance of surface markings;
(b) Drawings;
(c) Determination of the exact date of dichotomy;
(d) Observations of the unilluminated part of Venus, and
(e) Appearance of the terminator.

Drawings can be made on the scale of two millimeters per second of arc. Most markings, which are not genuine surface features, are indefinite and should be shown as such. Indeed, depicting this planet largely consists of illustrating the play of light and shade, rather than sketching sharply defined markings.

At times bright, even brilliant, white areas are seen especially around the cusps. These areas are best marked off on the drawings by dotted lines.

The writer marks on his drawings letters—A; B; C; etc.—as references. Such letters should be shown alongside the drawing not on it. The descriptive note then refer to these letters, thus making the indentification certain. Such descriptions can be brief and, unless one is using a reflector, completely free from reference to colour.

Dichotomy is the term used when the terminator is straight. Determination of the exact date of this occurrence is important. The terminator varies considerably in shape and often the cusps appear to extend beyond the terminator. When this phenomenon is seen it should be noted, whilst the shape of the terminator should always be stated or shown on a drawing.

On occasions the unilluminated portion of Venus has been much like the old Moon in the new Moon's arms. But the appearance varies considerably and full details should be recorded of any such occurrence.

MARS

This article will not tell you how to see the canals in one easy lesson. More nonsense has been written on this planet than on all the rest of the heavens. In observing Mars it is essential to disregard all previous records as far as is possible. *Don't consult reference books showing previous drawings until an opposition is over.*

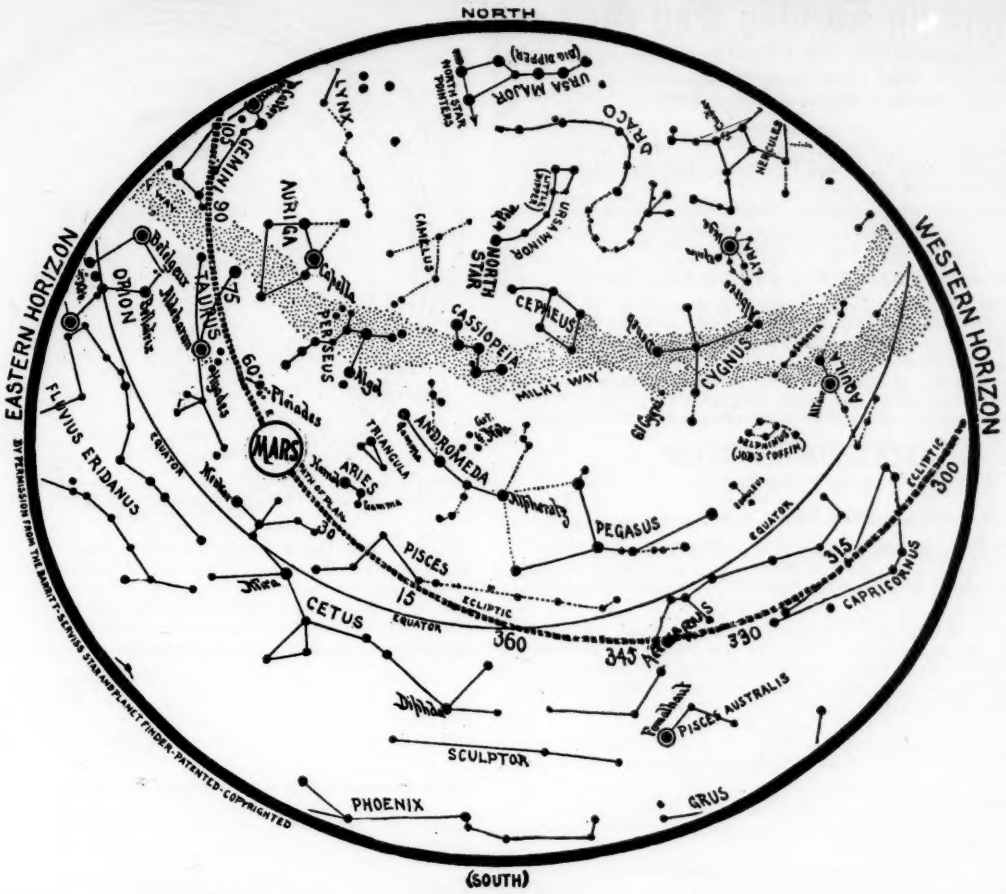
At favourable oppositions Mars is a fascinating study and many of the surface features are easy to see. Instruments of 3 inches and upwards will provide glimpses of the surface features. However, for useful work a refractor of 6 inches or larger and a reflector of 8 inches or more are required.

The principal observations concern:

(a) Drawings of the planet, i.e., whole disk drawings.
(b) Notes on the featurers visible.
(c) Transits.
(d) Records of clouds; changes in colour; temporary obscurations.

—Continued on Page 8

EVENING SKY MAP FOR NOVEMBER



AT 9:00 P.M., NOV. 1 8:00 P.M., NOV. 15 7:00 P.M., NOV. 30

Face South and hold the Map overhead, the top North, and you will see the stars and planets just as they appear in the heavens. The arrow through the two stars in the bowl of the Big Dipper points to the North Star, the star at the end of the handle of the Little Dipper. This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitudes in Europe.

RADIO SCIENCE AND ASTRONOMY

By A. E. Covington

Within the past decade the rapidly developing techniques of the radio laboratory have been applied to further our understanding of the universe in the sense of observational astronomy. This association of a very new science with one of the oldest of sciences, seems natural in view of the original experiment of Hertz in 1887. These showed that light waves and radio waves are electromagnetic disturbances which differ only in wave-length. Once this similarity had been established, it was realized that many of the well known optical experiments could be appropriately translated to corresponding radio experiments. Thus, about 1900 it seemed very logical to expect the thermal emission from a hot body such as the sun to extend from the known region of short wave-length—the visible optical region—into the newly-discovered wave-length region of the Hertzian waves. Radio pioneers attempted to find this solar radio emission but none was found; the early equipment of the pioneers was not sensitive enough to measure such small intensities. It remained for later investigators, working with greatly improved equipment about 1943 to find this emission as an unexpected result of other investigations.

The early science of radio was soon concerned with the important task of using radio waves to communicate from point to point on the earth's surface. First, short distances were spanned and finally, through perseverance on the part of Marconi, signals were transmitted across the Atlantic Ocean in 1902. The explanation of this unexpected transmission from one point to another point below the visible horizon required a reflecting layer in the upper atmosphere. Through a study of the propagation of radio waves man had come into contact with the upper regions of the earth's atmosphere which were required to be highly ionized in order to provide the reflecting surface for the radio waves. About the same time, the existence of such an ionized layer was also required to explain the daily variations of the magnetic compass.

In 1925 new radio techniques were employed by Appleton and Barnett in England, and by Breit and Tuve in the United States, to give detailed characteristics of the ionosphere. The method of the latter workers used the known velocity of propagation of radio waves, together

—Continued on Page 9

The

Monthly Evening Sky Map

FOUNDED IN 1905 BY LEON BARRITT

MRS. LEON BARRITT, Editor
Irving L. Meyer, Managing Editor

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AMATEUR'S FORUM

BY IRVING L. MEYER, M. S.

OCTOBER, 1958

THE SUN: is proceeding rapidly into the southern hemisphere. It moves through Virgo most of the month, to the Libra boundary. It is 93.0 million miles from the earth the 1st, against 92.2 million miles the 31st.

On the 12th, there will be a total eclipse of the Sun, but it will not be visible at all in North America. The path of totality will cross the south Pacific Ocean, barely touching an area of Chile and Argentina at sunset. A partial eclipse can be seen from portions of South America, Australia, the East Indies, and Antarctica. At Tutuila, Samoa, the eclipse will be 88% of total, with the middle of the eclipse occurring at 2:47 p.m., E.S.T. It is unfortunate that this eclipse crosses so much ocean, as it has a maximum duration of totality of 5 minutes 11 seconds.

THE MOON: is at *perigee* (closest to the earth) the 12th at 222,000 miles distance; it is at *apogee* (farthest from the earth) the 26th at 252,000 miles distance.

Libration: Maximum exposure of the regions on the Moon's limbs takes place as follows:

October 7 East limb, 7.5°
October 7 North limb, 6.8°
October 19 West limb, 7.8°
October 19 South limb, 6.8°

The Moon's Phases (E.S.T.) :

Last Quarter	October 5 at	8:20 pm
New Moon	12 at	3:52 pm
First Quarter	19 at	9:07 am
Full Moon	27 at	10:41 am

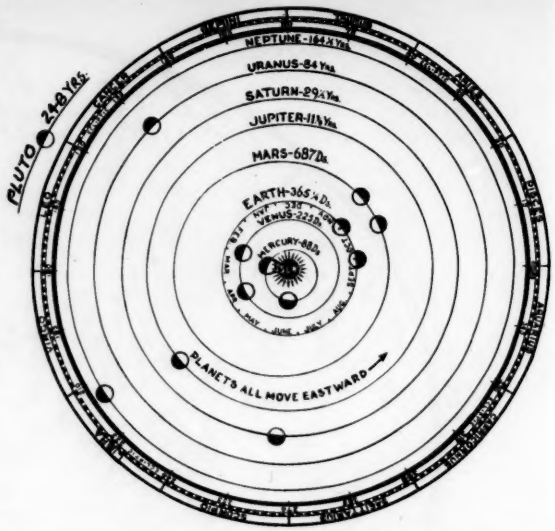
MERCURY: after its wonderful encounter with Venus last month—they were brilliant twins in the early dawn sky—we are in for a letdown this month. Still in the morning sky the beginning of the month, it is in superior conjunction with the Sun the 5th, thereupon entering tthe evening sky. Not observable all month, as it moves from Virgo into Libra. Distance reaches a maximum the 13th at 132 million miles.

VENUS: still in the morning sky, but so close to the Sun that observability is strictly curtailled. In the telescope it is nearly round, presenting an intensely bright disc some 10" in diameter. In Virgo all month, but too close to the Sun to observe. Distance increases from 156 to 159 million miles during the month.

MARS: is the undisputed sovereign of the night skies. A brilliant, ruddy object, it holds sway just south of the Pleiades in Taurus. On the 1st, this planet is magnitude -1.2, diameter is 16", illumination of the disc is 91%, distance is 56 million miles, and the planet's *south* pole is inclined 8° toward the earth and 21° toward the Sun; on the 31st, magnitude is -1.8, diameter 19", illumination 98%, distance 46 million miles, and the *south* pole is inclined 11° toward the earth and 16° toward the Sun. Though Mars is not a big object in the telescope, small instruments can reveal much detail. The polar cap (this year, the southern) and larger markings, such as the Syrtis Major, are readily observed.

JUPITER: on the Virgo-Libra boundary, is in the evening sky all month, but too close to the Sun for satisfactory observation. Distance from the earth the 15th is 592 million miles.

HELIOCENTRIC POSITIONS OF THE PLANETS, OCTOBER



The planets are shown in their respective orbits. Two positions, one for the first, and one for the last day of the month are given for Mercury, Venus, Earth, and Mars. The arrow indicates the last day of the month. Jupiter, Saturn, Uranus, Neptune, and Pluto are shown in their mean position for the current month.

SATURN: at the bottom (south) ofOphiuchus, is in the evening sky all month, setting a few hours after the Sun. Still observable, but too far pastopposition for really choice observations. A small telescope can still reveal its unique ring system, and brighter satellites Distance the 15th is 977 million miles.

URANUS: can now be seen in the morning sky, on the Cancer-Leo boundary. A sixth-magnitude planet, a small telescope can reveal its small, round, greenish disc. It rises a few hours after midnight, and is well placed for observation by dawn. Distance the middle of the month is 1751 million miles.

NEPTUNE: another inhabitant of Virgo, is too close to the Sun all month to be observable. It is in conjunction with the Sun on the 28th, then entering the morning sky. Never visible to the naked eye, this giant planet is 2908 million miles away the 15th.

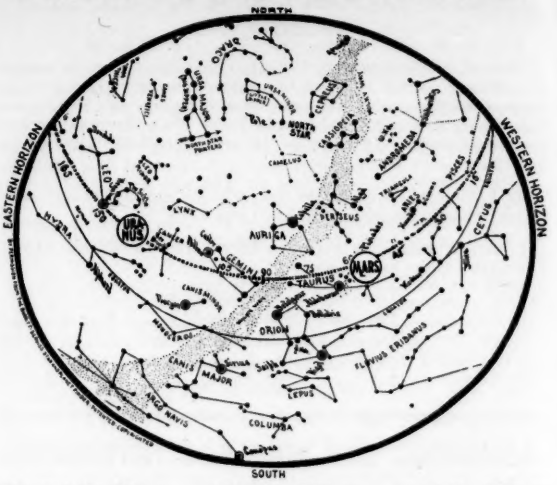
ASTRONOMICAL CALENDAR

Eastern Standard Time

OCTOBER, 1958

October	2— 1:23 pm	Conjunction, Mars and Moon; Mars north 1° 46'
	3— 3:— pm	Venus greatest heliocentric latitude north
	3— 4:38 pm	Minimum of Algol
	5— 7:— am	Superior conjunction, Mercury and Sun; Mercury north 1° 12'
	6— 1:26 pm	Minimum of Algol
	8—11:02 am	Conjunction, Uranus and Moon; Uranus north 5° 43'
	9—10:15 am	Minimum of Algol
	9— 5:— pm	Mercury stationary in Right Ascension
	12———	Total eclipse of the Sun
	12— 4:34 am	Conjunction, Venus and Moon; Venus north 2° 34'
	12— 7:04 am	Minimum of Algol
	13— 1:15 am	Conjunction, Mercury and Moon; Mercury north 0° 9'
	13— 3:49 pm	Conjunction, Neptune and Moon; Neptune north 0° 39'
	13— 8:34 pm	Conjunction, Jupiter and Moon; Jupiter south 0° 26'
	15— 3:52 am	Minimum of Algol
	16—Noon	Mercury in descending node
	16— 8:12 pm	Conjunction, Saturn and Moon; Saturn south 3° 28'
	18—12:41 am	Minimum of Algol
	19— 5:— am	Conjunction, Mercury and Neptune; Mercury south 2° 8'

MORNING SKY MAP FOR OCTOBER



AT 5:00 A.M., OCT. 1; 4:00 A.M., OCT. 15; 3:00 A.M., OCT. 31

20	— —	Orionid Meteor Shower
20	9:30 pm	Minimum of Algol
22	7:— am	Conjunction, Mercury and Jupiter; Mercury south 1° 41'
23	6:19 pm	Minimum of Algol
26	3:07 pm	Minimum of Algol
26	7:— pm	Mercury in aphelion
28	6:— am	Conjunction, Neptune and Sun
29	11:56 am	Minimum of Algol
29	2:14 pm	Conjunction, Mars and Moon; Mars north 2° 43'
31	9:— am	Conjunction, Venus and Neptune; Venus south 0° 44'

AMATEUR'S FORUM

BY IRVING L. MEYER, M. S.

NOVEMBER, 1958

THE SUN: now deep in the southern hemisphere, has brought short days to the north, with consequently increased hours for astronomical observation. It moves through Libra, into Scorpio. Distance decreases from 92.2 to 91.6 million miles.

THE MOON: is at perigee the 10th at 222,000 miles distance, and is at apogee the 23rd at 252,000 miles.

Libration: Maximum exposure of the regions on the Moon's limbs takes place as follows:

November 3 North limb, 6.8°
November 4 East limb, 7.1°
November 16 South limb, 6.7°
November 17 West limb, 7.8°
November 30 North limb, 6.7°

The Moon's Phases (E.S.T.) :

Last Quarter	November	4 at 9:19 am
New Moon		11 at 1:34 am
First Quarter		17 at 11:59 am
Full Moon		26 at 5:16 am

MERCURY: races from Libra, through Scorpio and Ophiuchus, to the Sagittarius boundary, as an evening sky object all month. Greatest elongation from the Sun is reached the 20th, but this elongation favors the southern hemisphere. For a few days around the 20th Mercury is observable low in the west, a bright (magnitude -0.2) star, close to the western horizon in the twilight zone. At elongation, the telescope will show it *gibbous*, but in the following few days it will change to crescent phase. Distance the 1st is 123 million miles, decreasing to 77 million miles the end of the month.

VENUS: travels close to the Sun, from Virgo, through Libra, into the Ophiuchus-Scorpio region. It is much too close to the Sun to be observable. It is in conjunction with the Sun on the 11th, thereupon entering the morning sky. Distance from the earth reaches a maximum the 10th at 159 million miles.

MARS: king of the night skies, is closest to the earth the 8th, at 45,300,000 miles, and is at opposition the 16th. On the 8th, when closest, diameter is 19.2", and magnitude is -1.9; at opposition on the 16th, diameter has decreased to 19.0", but magnitude has increased to -2.0. At first glance, so bright an object is disappointing in the telescope, as the disc is very small. Patience will reward the observer with details of dark greenish surface markings and the south polar ice cap. Also, the rotation of the planet, almost the same as that of the earth's, is readily apparent. Though this opposition is not as favorable, from a distance standpoint, as the last, it is much better placed for northern observers. High in Taurus all month.

JUPITER: in Libra, too close to the Sun all month to be observable. It is in conjunction with the Sun the 4th, entering the morning sky at that time. It is 596 million miles from the earth at its greatest distance, the 3rd.

SATURN: in Ophiuchus, in the evening sky, is too close to the Sun for worthwhile observation. Toward the end of the month, Saturn is close to Mercury (2½° to the north) though, technically, no conjunction occurs. Distance from the earth is 1011 million miles the 15th.

URANUS: remains close to the Cancer-Leo boundary, just west of the famous "Sickle" of Leo. Barely visible to the naked eye, it rises about midnight, and is best placed for observation just before dawn. A small telescope, together with a magnification of 50 diameters and upward, will reveal this planet's neat, round disc. Distance the 15th is 1702 million miles.

NEPTUNE: remote and faint, this telescopic object is in Virgo all month, close to the Sun in the morning sky. Not observable, but getting better placed as the months go by. Distance the middle of the month is 2905 million miles.

ASTRONOMICAL CALENDAR

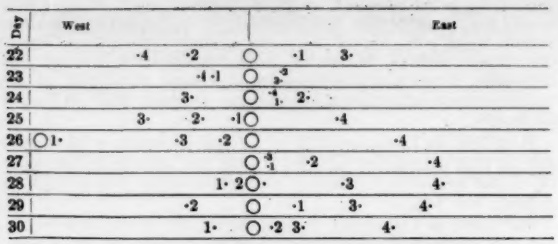
Eastern Standard Time

NOVEMBER, 1958

November	1	8:45 am	Minimum of Algol
	4	5:34 am	Minimum of Algol
	4	8:— pm	Conjunction, Jupiter and Sun
	4	8:33 pm	Conjunction, Uranus and Moon; Uranus north 5° 40'
	5	— —	Taurid Meteor Shower
	6	11:— am	Conjunction, Venus and Jupiter; Venus south 0° 6'
	7	2:23 am	Minimum of Algol
	8	7:— am	Mars in ascending node
	8	8:— am	Mars nearest earth
	9	12:— am	Quadrature, Uranus and Sun
	9	11:12 pm	Minimum of Algol
	10	4:42 am	Conjunction, Neptune and Moon; Neptune north 0° 33'
	10	5:14 pm	Conjunction, Jupiter and Moon; Jupiter south 0° 59'
	11	12:40 am	Conjunction, Venus and Moon; Venus south 1° 40'
	11	7:— am	Superior conjunction, Venus and Sun; Venus north 0° 40'
	12	11:13 am	Conjunction, Mercury and Moon; Mercury south 6° 25'
	12	8:00 pm	Minimum of Algol
	13	10:32 am	Conjunction, Saturn and Moon; Saturn south 3° 36'
	15	4:49 pm	Minimum of Algol
	16	— —	Leonid Meteor Shower
	16	3:— am	Mercury greatest heliocentric latitude south
	16	9:— am	Opposition, Mars and Sun
	18	1:38 pm	Minimum of Algol
	20	2:— pm	Mercury greatest elongation east, 22° 13'
	21	10:27 am	Minimum of Algol
	22	7:— am	Uranus stationary in Right Ascension
	24	7:16 am	Minimum of Algol
	25	1:40 am	Conjunction, Mars and Moon; Mars north 3° 25'
	27	4:05 am	Minimum of Algol
	28	5:— pm	Venus in descending node
	30	12:54 am	Minimum of Algol
	30	3:— am	Mercury stationary in Right Ascension

SATELLITES OF JUPITER

NOVEMBER



Appearance of Jupiter and its satellites at 7:45 A.M., .E.S.T. as seen in an inverting telescope

Jupiter is represented by the disc in the center of the chart and each satellite by a dot and its appropriate number. The direction of the satellite's motion is from the dot toward the numeral. The numeral and light disc at the left margin of the chart indicates a satellite in transit across Jupiter's disc; the numeral and dark disc at the right margin indicates a satellite which is invisible because it is being eclipsed or occulted by Jupiter. This chart must be held upside down if binoculars, opera glasses, or an erecting type telescope is used.

Because of Jupiter's nearness to the Sun, the charts of satellites are omitted from October 1 to November 21.

JUPITER'S SATELLITES

The four bright satellites of Jupiter are of continual interest to the observer with a small telescope. These satellites, in their motion about their parent planet, are eclipsed by the shadow cast by Jupiter, occulted by the planet itself, and can be seen in transit across Jupiter's disk. Even the shadows of the satellites can be glimpsed as they cross the face of the planet. It is unusual, however, to happen to observe one satellite transit another. On the evening of February 19, 1955 two observers, one in New York and one in Uniontown, Pa., saw Europa, satellite II, transit directly across Ganymede, satellite III, at 9:22 p.m. E.S.T. Transits of one satellite by another are not predicted, but the other phenomena of the bright satellites appear in the OBSERVER'S HANDBOOK.

Besides the four bright satellites, Jupiter has eight other moons which are extremely faint. One of these faint, distant satellites, number VIII, has been lost for long intervals of time since its discovery in 1908. It was last seen in 1941. On the average this satellite is about 15 million miles from Jupiter; this, combined with its small size (estimated to be less than forty miles), results in the satellite undergoing complex perturbations caused by the sun. To compute the ephemeris of the satellite by an ordinary desk calculating machine is much too laborious to be attempted. And thus the little satellite was lost. Recently however, Dr. Paul Herget of Cincinnati Observatory, assisted by Dr. John Mauchly, has used UNIVAC, Remington Rand's electronic computer, to calculate the positions of Jupiter VIII for every ten days from 1940 to 1980. The predicted positions were sent to Dr. Seth B. Nicholson of Mount Wilson and Palomar Observatories. On January 25, 1955 Jupiter VIII was found within one minute of arc of its predicted place on that date. Dr. Herget reports that as a result of the computed ephemeris it should be possible the satellite should be able to be photographed each time Jupiter is at opposition.

—*Journal of the Royal Astronomical Society of Canada*

AMATEUR'S FORUM

BY IRVING L. MEYER, M. S.

DECEMBER, 1958

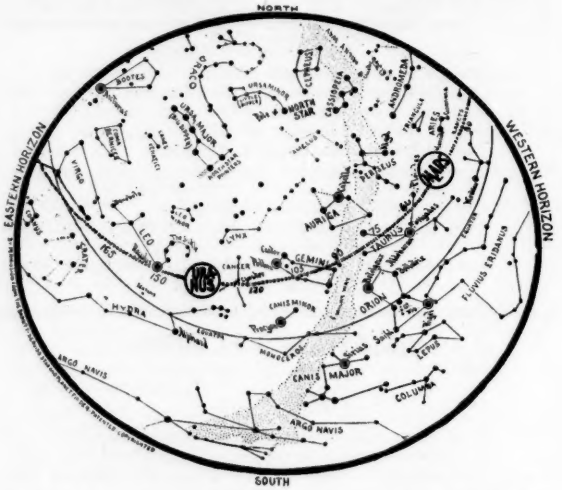
THE SUN: just prior to Christmas, the Sun makes its deepest penetration into the Southern hemisphere; thereafter it commences an increasingly speedy climb northward. It moves from Scorpio into Sagittarius, but on the 22nd enters the *sign* of Capricornus, marking the winter solstice. Distance the 1st is 91.6 million miles; on the 31st, 91.4

THE MOON: is closest to the earth the 8th at 225,000 miles, and is farthest the 20th at 252,000 miles.

Libration: Maximum exposure of the regions on the Moon's limbs takes place as follows:

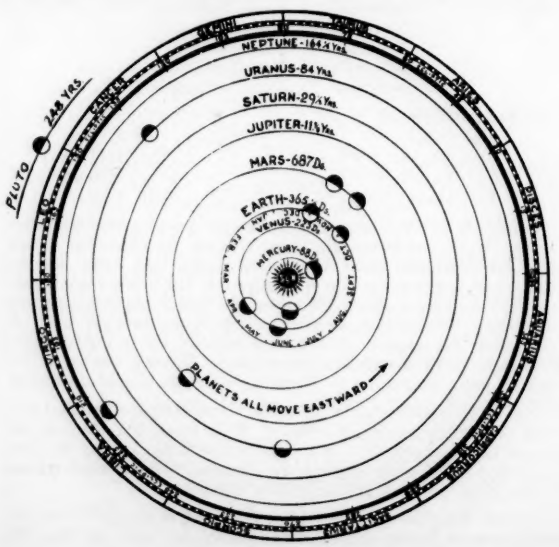
December 2 East limb, 6.1°
December 13 South limb, 6.6°
December 15 West limb, 7.0°
December 27 North limb, 6.5°
December 28 East limb, 5.0°

MORNING SKY MAP FOR NOVEMBER



AT 5:30 A.M., NOV. 1; 4:30 A.M., NOV. 15; 3:30 A.M., NOV. 30

HELIOCENTRIC POSITIONS OF THE PLANETS, NOVEMBER



The Moon's Phases (E.S.T.) :

Last Quarter	December 3 at 8:24 pm
New Moon	10 at 12:23 pm
First Quarter	17 at 6:52 pm
Full Moon	25 at 10:54 pm

MERCURY: this, the swiftest of the planets, races from the western evening sky, crosses between the earth and the Sun on the 9th, enters the morning sky, and arrives at greatest western elongation on the 29th. For a week or so around the 29th it will be observable in the early dawn sky, close to the eastern horizon. Magnitude will be about -0.1, and it will appear *gibbous*—much like the Moon a few days after the first quarter. Apparent diameter will be about 6"—large enough to be apparent in small telescopes. It spends the entire month in the Ophiuchus-Scorpio area, retrograding most of the time. Distance from the earth at its closest on the 10th, is 63 million miles.

VENUS: is in the evening sky, but very close to the Sun. It can be observed with difficulty, particularly later in the month as the planet widens the gap between it and the Sun. Binoculars are a big help. At magnitude -3.4, it is exceedingly bright, but will only be visible in strong twilight, near the western horizon. Distance from the earth the 1st is 158 million miles, decreasing to 154 million miles by the end of the month.

MARS: on the Aries-Taurus boundary, high in the northern hemisphere, is very well placed for observation. Brilliant, of a reddish hue to the naked eye, it is best observed under higher telescopic powers—200 diameters and more. With this type magnification, the dark green markings—such as the Syrtis Major, a funnel-shaped object—are readily seen. The polar cap (southern) should be visible since it is turned decidedly toward the earth, but since Mars is well past summer in its southern hemisphere, the cap could have pretty much melted by this time. Incidently, summer on Mars' southern hemisphere commenced about August 15, our date. During December, distance increases from 50 million miles, to 67 million miles, causing apparent diameter to decrease from 18" to 13", and magnitude from -1.6 to -0.6.

JUPITER: in central Libra, can now be seen in the late morning sky. It is another bright planet, averaging magnitude -1.3 during the month. Though still very close to the Sun, its great size gives it an apparent diameter of about 32" during the month. Small telescopes reveal the flattened disc, and reddish cloud bands. The bright satellites—Io, Europa, Ganymede, and Callisto—are visible in binoculars. Distance from the earth the middle of the month, is 578 million miles.

SATURN: commences the month in the evening sky, is in conjunction with the Sun on the 20th, and then enters the morning sky. It is too close to the Sun all month to be observable. It is far south of the equator, in Sagittarius. Distance from the earth reaches a maximum for the year of 1026 million miles on the 20th.

URANUS: rises well before midnight on the Cancer-Leo boundary. Well placed for observation, it is, nevertheless, a faint planet —on the limit of naked eye visibility. Small telescopes reveal the neat, round disc. Distance the middle of the month is 1658 million miles; apparent diameter is 3.8".

NEPTUNE: in the morning sky, in Virgo, is faint—invisible to the naked eye. At magnitude 8, a telescope, or good binoculars, is required to reveal this great planet as a faint point of light. A power of 100 diameters on a telescope reveals a small, dull disc. It is still quite a few month from opposition, but it will not brighten appreciably during the interval. Distance the middle of the month is a tremendous 2880 million miles.

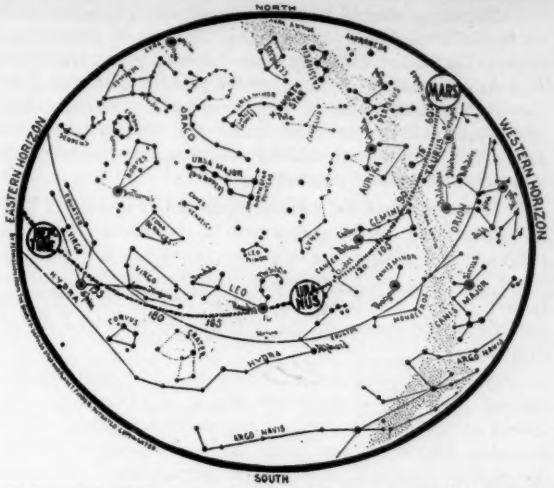
ASTRONOMICAL CALENDAR

Eastern Standard Time

DECEMBER, 1958

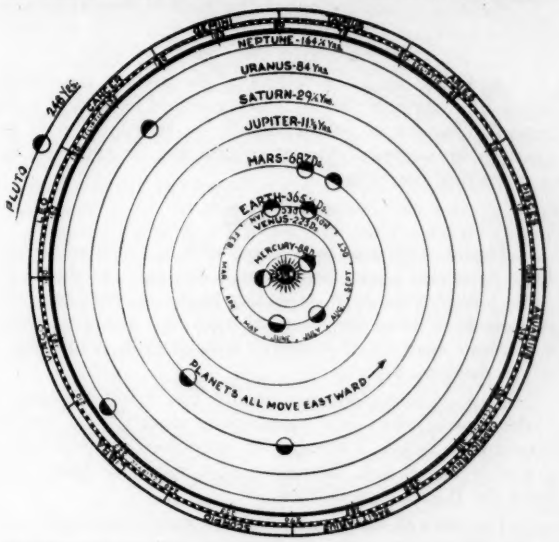
December	2— 2:41 am	Conjunction, Uranus and Moon; Uranus north 5° 31'
	2— 9:43 pm	Minimum of Algol
	5— 4:— am	Mercury in ascending node
	5— 6:32 pm	Minimum of Algol
	7— 6:— am	Conjunction, Mercury and Venus; Mercury north 1° 3'
	7— 4:22 pm	Conjunction, Neptune and Moon; Neptune north 0° 24'
	8— 1:16 pm	Conjunction, Jupiter and Moon; Jupiter south 1° 32'
	8— 3:21 pm	Minimum of Algol
	9— 7:— pm	Mercury in perihelion
	9—10:— pm	Inferior conjunction, Mercury and Sun; Mercury north 1° 34'
	10— 9:58 am	Conjunction, Mercury and Moon; Mercury south 2° 31'
	11—12:10 am	Minimum of Algol
	11—12:52 am	Conjunction, Venus and Moon; Venus south 5° 6'
	11— 2:45 am	Conjunction, Saturn and Moon; Saturn south 3° 41'
	12—12:— am	Conjunction, Venus and Saturn; Venus south 1° 30'
	13———	Geminid Meteor Shower
	14— 8:59 am	Minimum of Algol
	17— 5:48 am	Minimum of Algol
	19— 9:— pm	Mercury stationary in Right Ascension
	20— 1:— am	Mercury greatest heliocentric latitude north
	20— 2:38 am	Minimum of Algol
	20— 7:— am	Conjunction, Saturn and Sun
	20— 1:— pm	Mars stationary in Right Ascension
	21—11:56 pm	Conjunction, Mars and Moon; Mars north 4° 5'
	22———	Ursid Meteor Shower
	22— 3:40 am	Sun enters Capricornus; Solstice
	22—11:27 pm	Minimum of Algol
	25— 8:16 pm	Minimum of Algol
	28— 5:05 pm	Minimum of Algol
	29— 7:02 am	Conjunction, Uranus and Moon; Uranus north 5° 21'
	29— 9:— am	Mercury greatest elongation west, 22° 25'
	31— 1:54 pm	Minimum of Algol

MORNING SKY MAP FOR DECEMBER



AT 4:30 A.M., DEC. 1; 3:30 A.M., DEC. 15; 2:30 A.M., DEC. 31

HELIOCENTRIC POSITIONS OF THE PLANETS, DECEMBER



—Continued from Page 2

Drawings should be made on smooth paper, or cards of Bristol Board, cut to a uniform size, say 6 inches by 4 inches. The actual drawings were formerly asked for by the B.A.A. on a scale of 2 inches to the planet's diameter. Now they recommend a scale of 3 millimetres = 1 second. Black and white sketches are best unless the observer is a real artist. All drawings should be completed at the telescope and never retouched afterwards.

Draw exactly what you see. If an object is doutful omit it, although it can be mentioned in the notes. Draw the polar cap first, taking care to get its correct size and position. Then add the more prominent features; finally add the fainter detail. The longitude of the central meridian and latitude of the centre of the disk should be stated on all drawings.

Any descriptive notes should be clear and concise, leaving no doubt as to which object is referred to. The colour of the disk, as well of the various regions, should be stated. The writer uses letters on his drawings to identify the objects described, leaving the identification of names until an opposition finishes. This cuts to a minimum any tendency to bias after inspection of charts or drawings by others.

Reliable determinations can be made of transits of well defined markings across the central meridian of the disk only close to the actual opposition date. These are then useful.

At times clouds, or veiling of the surface, have been noted. It is essential that an accurate record be kept of such events. Changes in colour should be noted, as well as changes in intensity. These include any brightening of features near the limb.

JUPITER

Useful work has been done with a 3-inch refractor, but a somewhat larger instrument is necessary. At the same time, Jupiter is the most interesting planet to study and one that can be followd for several months each year even with a moderate aperture. It presents a most diversified and constantly changing aspect.

Any intending observer should first learn the names of the various belts (dark regions) and zones (bright spaces between the belts). These can be ascertained from the diagrams in the B.A.A. Memoirs, most reference books or from the B.A.A. Green Book.

The work of the Jupiter Section consists mainly of:

(a) Timing transits of markings across the central meridian.
(b) Drawings with descriptive notes.
(c) Measurement of relative intensities of markings.
(d) Satellite observations.

Transit observations are the most important, since they enable the rotation periods for the various currents to be determined. The central meridian is an imaginary line joining the north and south poles of the planet. Transit recording consists of noting the time, to the nearest minute, when an object is on the central meridian.

Observers should refer to the B.A.A. Green Book mentioned earlier, where an excellent illustration is given of this type of record. It should be noted, however, that each observer should number his transit observations from 1 upwards for each opposition. Thus, if the last transit on say 1954, April 1st was 145; the first observation of 1954, April 2nd, or whatever was the next date of observing, would be 146. For the following opposition start again at 1. See that sufficient detail is stated to identify the object clearly and again an inspection of the B.A.A. Green Book will make this clear.

Drawings must be on a scale that allows for the equatorial bulge. Draw an ellipse to represent the planet's disk with the diameter of the major axis, 2½ inches. The ratio of the polar to the equatorial diameter should be 15 to 16. But, the writer can supply blank forms for drawings to any intended observer.

Drawings should be in black and white. The most obvious features should be sketched in quickly and accurately. The details are then added, working from the preceding limb. Due to the rapid rotation of Jupiter a drawing must not take too long, or else the aspect alters. All whole disk drawings should show the longitudes of the meridian according to both Systems I and II at the time of observation.

Descriptive notes can be brief, provided details of transits have been recorded. Often transit observations and notes are best supplemented by strip drawings, i.e., sketches of small portions of the disk showing the regions of greatest activity amongst which the majority of the transits have been recorded. On such sketches the serial numbers from the transit observations can be indicated so that identification of the objects concerned is certain.

Colour records are best when a reflector is used. In referring to colours endeavour to avoid such terms as "warm Indian red." Such terms have no meaning except in the imagination of the observer concerned. Stick to colour descriptions that are less fanciful, but which do convey a definite idea of the appearance noted.

The relative intensities of the belts and zones are best confined to noting the order of darkness for the belts and of brightness for the zones. The darkest belt is placed first; and the brightest zone first.

The four principal satellites can be usefully observed. The various transits, occultations and eclipses can be timed. In particular the appearance of both the satellites and their shadows during transit should be noted. At certain times the satellites undergo mutual eclipses, etc., which should always be recorded. Predictions of such phenomena appear in the *B.A.A. Handbook* for the years in which theese are visible.

SATURN

For this planet, telescopes larger than those suitable for Jupiter are generally necessary.

The greatest difficulty experienced by the average amateur is in getting the scale of his drawings of the globe and rings correct. Any observer should consult the *B.A.A. Journal,* Vol. 63, No. 8, 1953, October. There, Mr. Heath gives some useful hints on getting accurate outlines of the rings and globe with a minimum of effort.

Unlike Jupiter, whole disk drawings of Saturn are preferred. These should be made when possible. When a spot, white or dark, is visible detailed drawings of it, if prominent, should be made. Apart from drawings the principal work that can be done on Saturn is:

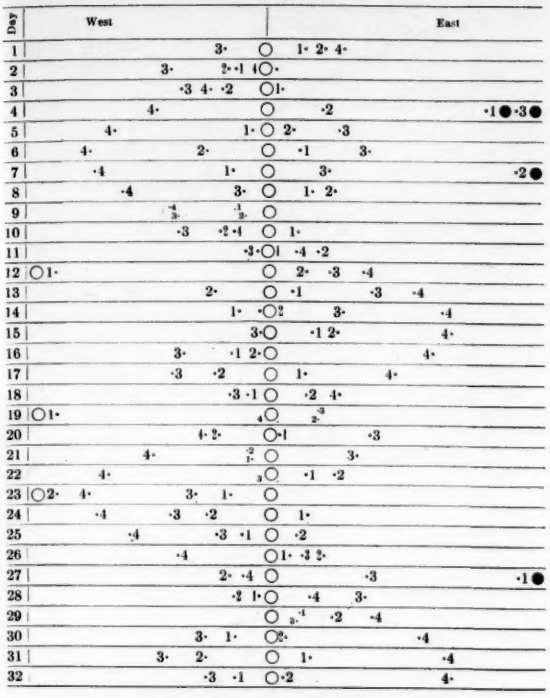
(a) Transits of markings across the central meridian.
(b) Description of any unusual spot or patch on globe or rings.
(c) Noting changes in shape or position of belts.
(d) Recording the aspect presented by the shadow of globe on rings and shadow of rings on globe, especially watching for any irregularities.
(e) Estimates of relative intensities of rings, belts and zones.
(f) If telescope is of sufficient size, determination of the magnitude of the satellites.

Transit of markings across the central meridian should be recorded as for Jupiter. As transits of spots are uncommon, reports of such objects, should be sent immediately to the Carter Observatory so that other observers can be notified. Most members can no doubt remember instances of past spots being detected.

—Continued on Page 9

SATELLITES OF JUPITER

DECEMBER



Appearance of Jupiter and its satellites at 7:30 A.M., E.S.T. as seen in an inverting telescope

—Continued from Page 8

Should the position or shape of the few belts visible change it should be noted. So should any irregularities in the shadows caused by the globe on the rings, or by the rings on the globe.

In estimating the relative intensities of the rings, belts and zones a scale of 0 (brightest) to 10 (darkest) is used and halves and quarters are also used. Two standards are adopted, viz., 1 for the brightness of the outer ring B in the ansae adjoining Cassini's Division and 10 for the blackness of a very dark sky or deep black shadow. Observers should consult the instructions in the B.A.A. Green Book.

Estimates of the magnitude of the satellities are made as for variable star observations, assuming the magnitude of Titan as 8.3. The greatest care must be exercised to see that the satellites are correctly identified. For this purpose the *Nautical Almanac* is essential. Some of the satellites undoubtedly change in brightness. Again the B.A.A. Green Book contains more detailed instructions.

GENERAL

The foregoing contains a brief outline of some of the principal features to be watched and recorded for these planets. It is far from exhaustive. No mention has been made for instance of accultations of stars by the planets; of micrometer measures of the positions of belts and much other information that can be observed.

When the observer has recorded observations he naturally wishes to know what to do with them. Jupiter observations should be sent to the writer; or if the observer prefers direct to the Director of the B.A.A. Jupiter Section with a copy to the writer.

The B.A.A. Section Director always welcome records from observers of Venus, Mars and Saturn whether the observer is a member of the B.A.A. or not. Or the observer may prefer to send his records to the American Association of Lunar and Planetary Observers. Or again he can send any observations to the writer, who is always prepared to see that they are sent on to those able to make use of them. But whatever happens don't make a useful series of observations and then be too lazy to communicate them to some person able to turn them to good account.

—SOUTHERN STARS, September, 1954

**B.A.A.=British Astronomical Association*

—Continued from Page 3

with the observed travel time of a pulse of radio waves, in order to find the height of the layer. Ultimately this principle was incorporated into radar. After several years of study the complex nature of the reflecting layer was outlined and it was recognized that the layers were subject to control by the sun. In 1935 other temporary ionizations in the upper atmosphere were related to the passage of meteors, and still other abnormal effects were related to geomagnetic activity.

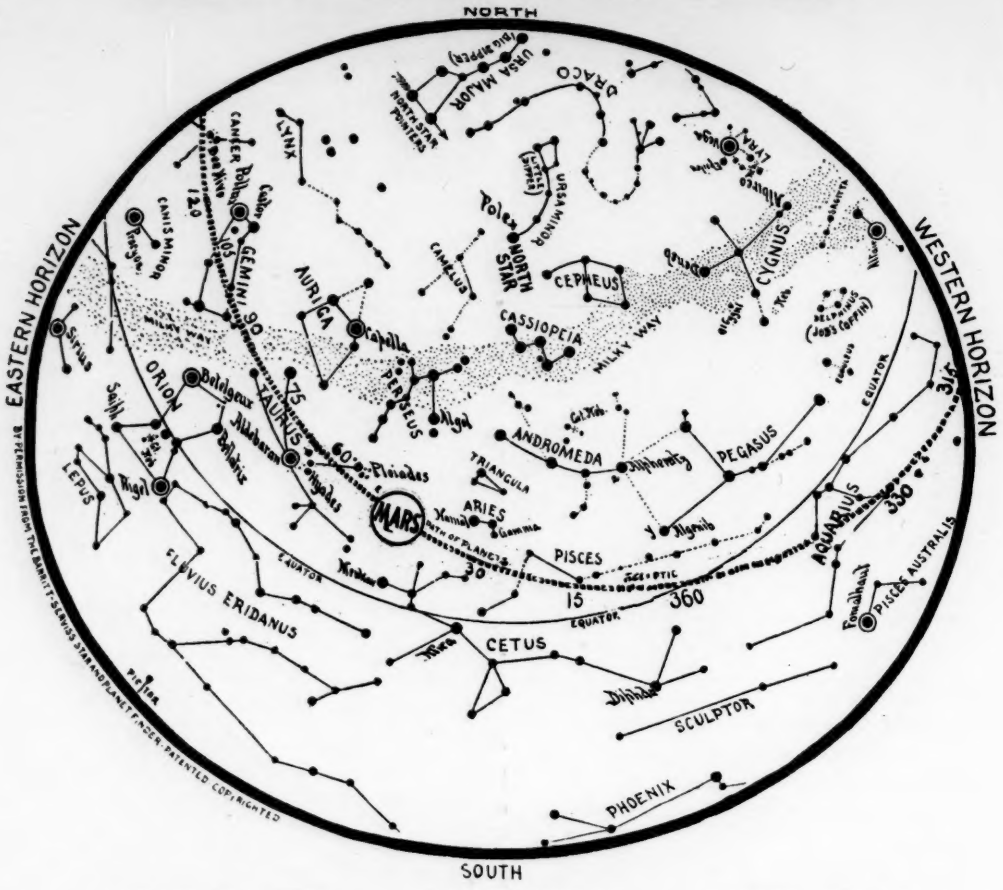
Radio equipment had been made exceedingly sensitive. In 1931 Jansky of the Bell Telephone laboratories was endeavouring to find the origin of some of the background noises which may be heard from any good short-wave receiver operating in the region of 20 megacycles/second. An unexpected residue of radio noise of constant magnitude could be traced as originating from the centre of our galaxy. Contrary to expectations no emission from the sun was found. Shortly afterwrads, Grote Reber, the only amateur radio-astronomer at that time, saw the need for a large radio-telescope to find the detailed distribution of galactic noise over the sky. He built and operated such an instrument—a 30-foot parabolic reflector—and for many years his contours were the only ones available. With the exception of Reber, no one pursued this discovery until after the Second World War.

Throughout this conflict there was a great development of radio technique and much equipment put into operational use. Its wartime uses led to two astronomical discoveries: solar radio emissions were unexpectedly detected by radar networks, and radar echoes from meteors were observed on equipment used to detect V2 rockets in England. After the war, the time had come for the active pursuit of the scientific observations which were incidental to other work. Many laboratories throughout the world became actively engaged, and unexpected fields opened out for the radio-astronomer. There are now many publications, and most of the subject matter of optical astronomy has been investigated. Topics range from the near and distant galaxies, interstellar neutral hydrogen, super-novae remnants, galactic nebulae, meteors, sun, moon, and most recent of all, the emission of radio from the planet Jupiter. In a very practical sense, the radio emission from the sun and moon has been picked up by a radio-telescope serving as a radio sextant. This gives sufficiently accurate information for ordinary ship navigation and has the tremendous advantage over visual means by being able to work through clouds and overcast.

Many of the publications which record the original work on radio-astronomy have been devoted to radio sciences, and hence are sometimes not readily accessible to the astronomical reader. At first glance, astronomical papers or notes of astronomical activities from a radio or electrical engineering institution may seem out of place in an astronomical magazine, but past history and present results show that this is only indicative of a new phase of astronomy.

—Journal of the Royal Astronomical Society of Canada

EVENING SKY MAP FOR DECEMBER



AT 9:00 P.M., DEC. 1 **8:00 P.M., DEC. 15** **7:00 P.M., DEC. 31**

Face South and hold the Map overhead, the top North, and you will see the stars and planets just as they appear in the heavens. The arrow through the two stars in the bowl of the Big Dipper points to the North Star, the star at the end of the handle of the Little Dipper. This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitudes in Europe.

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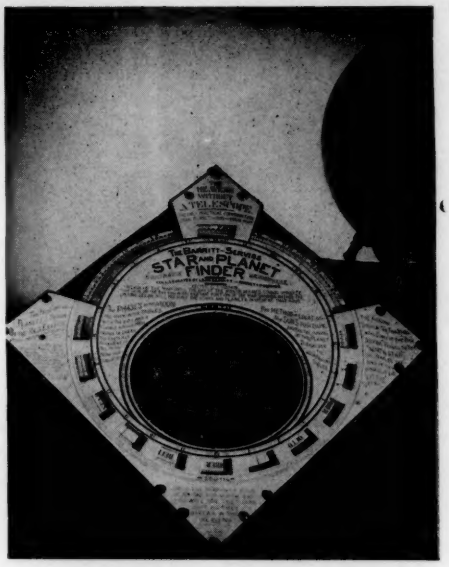

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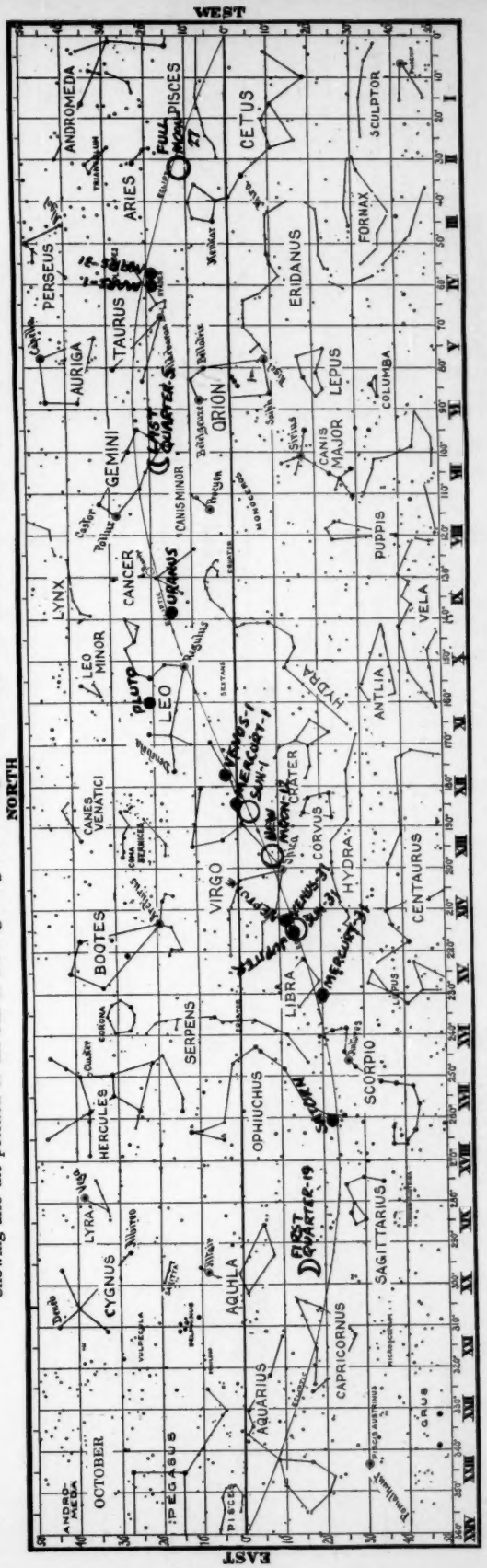
Showing also the position of the Sun at the beginning and ending of the month and the position of the Moon at its several phases.



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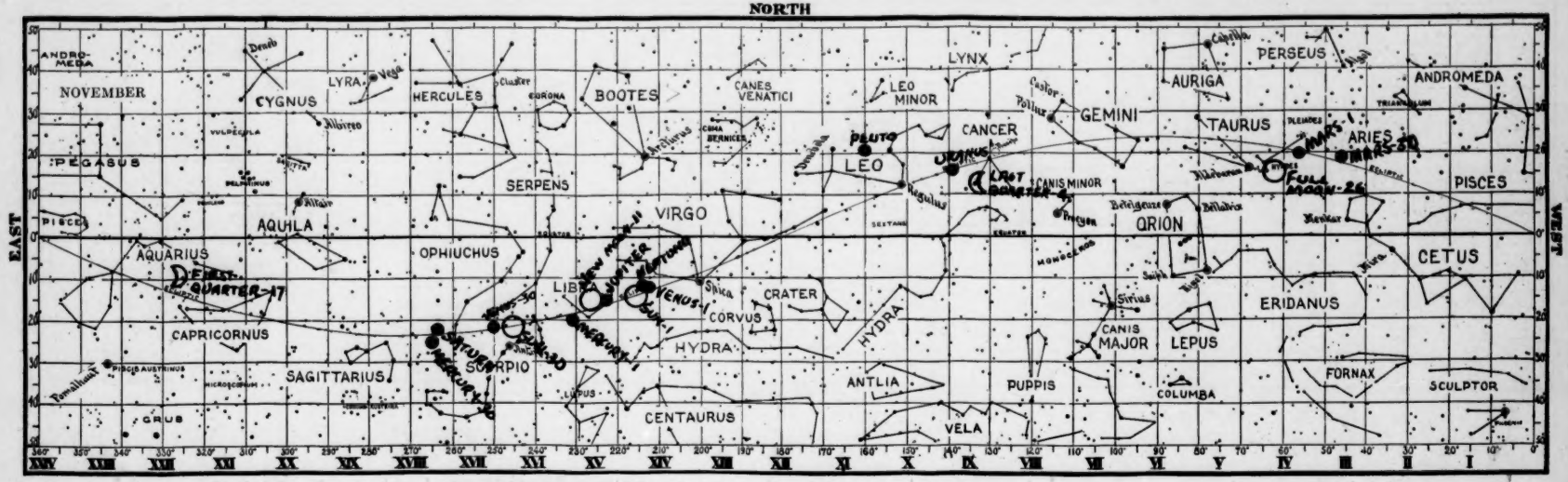

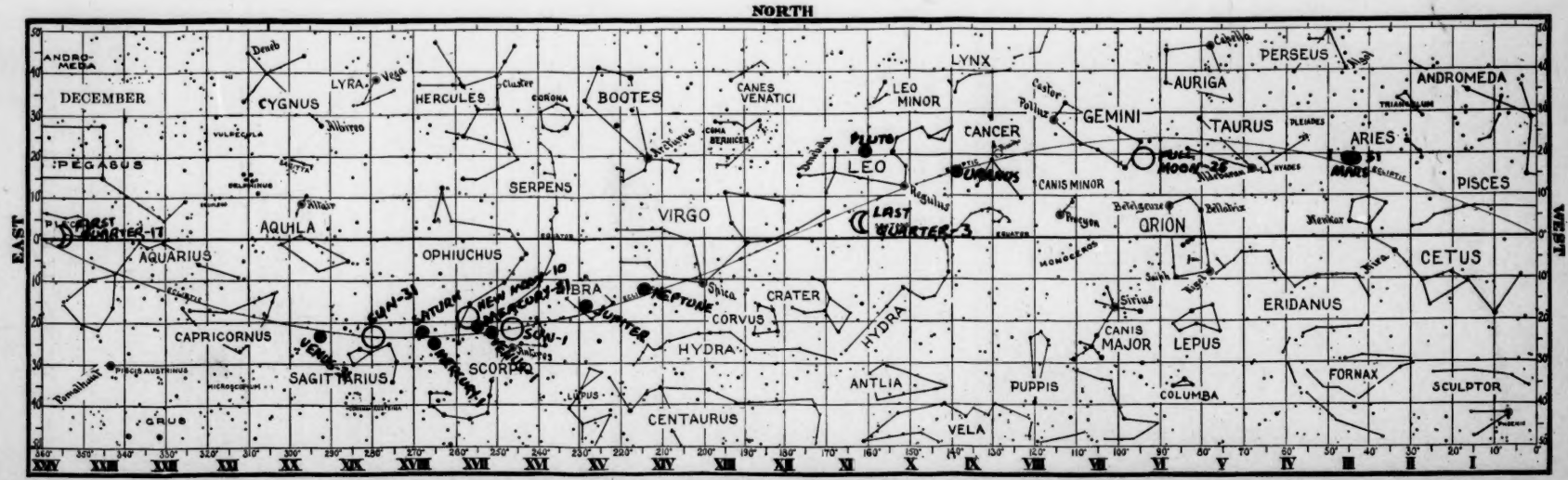

Nov. 5 Oct. 22 Oct. 5 Sept. 20 Sept. 5 Aug. 20 Aug. 5 July 20 July 5 June 20 June 5 May 20 May 5 Apr. 20 Apr. 5 Mar. 20 Mar. 5 Feb. 18 Feb. 2 Jan. 20 Jan. 5 Dec. 20 Dec. 5 Nov. 20

THE DATE BELOW EACH NUMERAL WILL SHOW WHEN THAT SECTION OF THE MAP WILL BE ON THE MERIDAN—DUE SOUTH—AT 9 P.M. OR AN HOUR EARLIER FOR EACH NUMERAL WEST OF THIS DATE AND AN HOUR LATER FOR EACH NUMERAL EAST.

XVM

Nov. 5 Oct. 22 Oct. 5 Sept. 20 Sept. 5 Aug. 20 Aug. 5 July 20 July 5 June 20 June 5 May 20 May 5 Apr. 20 Apr. 5 Mar. 20 Mar. 5 Feb. 18 Feb. 2 Jan. 20 Jan. 5 Dec. 20 Dec. 5 Nov. 20

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FOR EACH NUMERAL WEST OF THIS DATE AND AN HOUR LATER FOR EACH NUMERAL EAST.

XUM